

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Commissioner
 US Department of Commerce
 United States Patent and Trademark
 Office, PCT
 2011 South Clark Place Room
 CP2/5C24
 Arlington, VA 22202
 ETATS-UNIS D'AMERIQUE
 in its capacity as elected Office

Date of mailing (day/month/year) 02 March 2001 (02.03.01)	
International application No. PCT/GB00/02540	Applicant's or agent's file reference JBJ/P300192PCT
International filing date (day/month/year) 30 June 2000 (30.06.00)	Priority date (day/month/year) 01 July 1999 (01.07.99)
Applicant EVANS, Michael et al	

1. The designated Office is hereby notified of its election made:



in the demand filed with the International Preliminary Examining Authority on:

30 January 2001 (30.01.01)



in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35	Authorized officer Olivia TEFY Telephone No.: (41-22) 338.83.38
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REC'D 21 SEP 2001

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INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference JBJ/P300192PCT	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/GB00/02540	International filing date (day/month/year) 30/06/2000	Priority date (day/month/year) 01/07/1999
International Patent Classification (IPC) or national classification and IPC E05B65/12		
Applicant MERITOR LIGHT VEHICLE SYSTEMS (UK) LIMITED et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

- ☐ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand 30/01/2001	Date of completion of this report 19.09.2001
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Alexopoulos, T Telephone No. +49 89 2399 2853 

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02540

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, pages:

1-11 as originally filed

Claims, No.:

1-28 as originally filed

Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/GB00/02540

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	5-11, 15-28
	No:	Claims	1 - 4, 12 - 14
Inventive step (IS)	Yes:	Claims	5-11, 15-28
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-28
	No:	Claims	

2. Citations and explanations
see separate sheet

VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
see separate sheet

Re Item V

Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Claim 1 :

US 4 948 184 A discloses a latch mechanism including; a latch bolt (3) moveable between a primary latched position and an open position, a first pawl (4) moveable between a first engaged position, where it secures the latch bolt in at least its primary latched position and a second released position, where it releases the latch bolt from at least its first primary latched position, release means (16) moveable between a first engaged position, where it allows the first pawl to achieve its first engaged position and a second released position, where it retains the first pawl in its second released position, and a second pawl (17) moveable between a first engaged position, where it is capable of retaining the release means in its second released position, and a second released position, where it releases the release means from its second released position, such that the latch mechanism can be latched and unlatched.

Claims 2-4, 12 - 14 :

The subject-matter of claims 2, 4 and 13 is known from the same document, (see column 3, line 42 - column 5, line 11, figs. 1 - 4).

That of claims 3, 12 and 14 from GB 2 155 535 A, (see page 1, line 124 - page 2, line 57, figs. 1 - 3).

Claims 5-11, 15-28 :

The subject-matter of claims 5-11, 15-28 is neither known nor obviously derivable from the available prior art. Moreover said abutment or abutments in the drive train of the latch mechanism, moving the release means from their engaged position to a release position, enable the latch to operate consistently.

Re Item VII

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/GB00/02540

Certain defects in the international application

The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).

Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents US 4 948 184 A and GB 2 155 535 A is not mentioned in the description, nor are these documents identified therein.

Re Item VIII

Certain observations on the international application

Although claims 1, 22 and 23 have been drafted as separate independent claims, they appear to relate effectively to the same subject-matter and to differ from each other only with regard to the definition of the subject-matter for which protection is sought and in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack conciseness. Moreover, lack of clarity of the claims as a whole arises, since the plurality of independent claims makes it difficult, if not impossible, to determine the matter for which protection is sought, and places an undue burden on others seeking to establish the extent of the protection.

Hence, claims 1, 22 and 23 do not meet the requirements of Article 6 PCT.

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference JBJ/P300192PCT	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/GB 00/ 02540	International filing date (day/month/year) 30/06/2000	(Earliest) Priority Date (day/month/year) 01/07/1999
Applicant MERITOR LIGHT VEHICLE SYSTEMS (UK) LIMITED		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

☒ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

1
☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No:
PCT/GB 00/02540

A. CLASSIFICATION OF SUBJECT MATTER
E05B65/32,E05B65/12

According to International Patent Classification (IPC) or to both national classification and IPC⁷

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2155535 A (KIEKERT GMBH & CO KOMMANDITGESELLSCHAFT) 25 September 1985, page 1, line 124 - page 2, line 57, figs. 1-3.	1, 3, 4, 11 12, 13, 14
A	--	5, 15, 22
X	US 4948184 A (WEYERSTALL et al.) 14 August 1990, column 3, line 42 - column 5, line 11, figs. 1-4.	1, 2, 4, 13
A	--	
A	WO 95/09289 A1 (ROCKWELL INTERNATIONAL CORPORATION) 06 April 1995,	1

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search
22 November 2000

Date of mailing of the international search report
25.01.2001

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer
RABONG

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	pages 4,5, figs. 2-7. -- DE 3220705 A1 (TACK & GABEL GMBH & CO KG) 08 December 1983, pages 6-11, figs. 1-4. --	1
A	DE 19614123 A1 (ROBERT BOSCH GMBH) 16 October 1997, column 3, line 31 - column 4, line 59, figs. 1-6. ----	1, 3, 4, 12-16, 22

ANHANG

Zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

ANNEX

To the International Search Report to the international Patent Application No.

ANNEXE

Au rapport de recherche international relatif à la demande de brevet international n°

PCT/GB 00/02540 SAE 290247

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

This annex lists the patent family members relating to the patent documents cited in the above-mentioned search report. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche international visée ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l'Office.

Im Recherchenbericht angeführte Patentdokumente Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
GB A1 2155535	25-09-1985	DE A1 3406116	22-08-1985
GB B2 2155535	29-07-1987	DE C2 3406116	16-03-1989
		FR A1 2559828	23-08-1985
		FR B1 2559828	30-10-1987
		GB A0 8504190	20-03-1985
US A 4948184	14-08-1990	DE C1 3801581	13-10-1988
		ES AF 2011933	16-02-1990
		FR A1 2631070	10-11-1989
		IT A0 8919045	10-01-1989
		IT A 1228205	05-06-1991
WO A1 9509289	06-04-1995	EP A1 721538	17-07-1996
DE A1 3220705	08-12-1983	ES U 272594	16-12-1983
DE C2 3220705	28-08-1986	ES Y 272594	16-07-1984
		ES Y1 272594	27-07-1984
		FR A1 2528098	09-12-1983
		FR B1 2528098	22-06-1990
DE A1 19614123	16-10-1997	none	

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
11 January 2001 (11.01.2001)

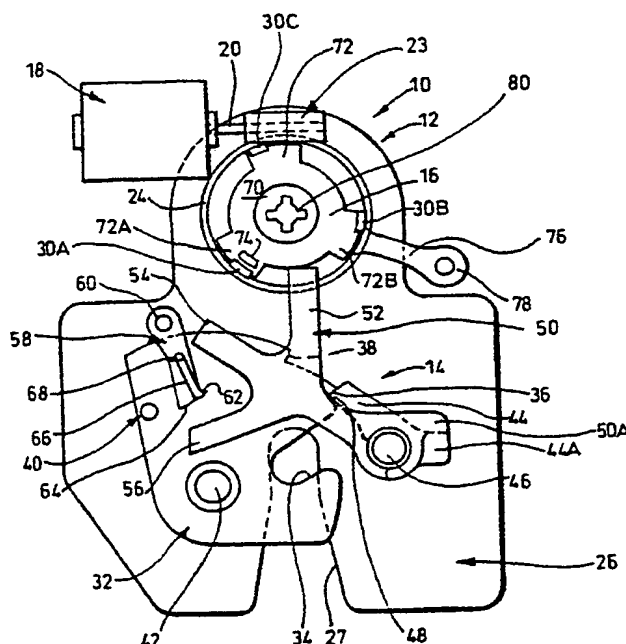
PCT

(10) International Publication Number
WO 01/02677 A2

- (51) International Patent Classification⁷: **E05B**
- (21) International Application Number: **PCT/GB00/02540**
- (22) International Filing Date: **30 June 2000 (30.06.2000)**
- (25) Filing Language: **English**
- (26) Publication Language: **English**
- (30) Priority Data:
9915432.0 1 July 1999 (01.07.1999) **GB**
- (71) Applicant (for all designated States except US): **MERITOR LIGHT VEHICLE SYSTEMS (UK) LIMITED** [GB/GB]; Fordhouse Lane, Stirchley, Birmingham B30 3BW (GB).
- (72) Inventors; and
(75) Inventors/Applicants (for US only): **EVANS, Michael** [GB/GB]; Meritor Light Vehicle Systems (UK) Limited, Fordhouse Lane, Stirchley, Birmingham B30 3BW (GB). **FROST, James** [GB/GB]; Meritor Light Vehicle Systems (UK) Limited, Fordhouse Lane, Stirchley, Birmingham B30 3BW (GB). **SPURR, Nigel, Victor** [GB/GB]; 119 Tixall Road, Hall Green, Birmingham B28 0RP (GB). **LI, Mark, Hao** [CA/GB]; 68 Warwick Crest, Arthur Road, Edgbaston, Birmingham B15 2LH (GB).
- (74) Agents: **JONES, John, Bryn et al.**; Withers & Rogers, Goldings House, 2 Hays Lane, London SE1 2HW (GB).
- (81) Designated States (national): **JP, KR, US.**
- (84) Designated States (regional): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

[Continued on next page]

(54) Title: **LATCH ASSEMBLY**



(57) Abstract: A latch mechanism (10) including: a latch bolt (32) moveable between a primary latched position and an open position, a first pawl (44) moveable between a first engaged position, where it secures the latch bolt in at least its primary latched position and a second released position, where it releases the latch bolt from at least its first primary latched position, release means (50) moveable between a first engaged position, where it allows the first pawl to achieve its first engaged position and a second released position, where it retains the first pawl in its second released position, and a second pawl (58) moveable between a first engaged position, where it is capable of retaining the release means in its second released position, and a second released position, where it releases the release means from its second released position, such that the latch mechanism can be latched and unlatched.

WO 01/02677 A2



Published:

— Without international search report and to be republished upon receipt of that report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

LATCH ASSEMBLY

The present invention relates to latch assemblies, and in particular latch assemblies which are manually operable alone or latch assemblies which are both manually operable and power actuator operable.

The present invention is particularly applicable to latches used on vehicle doors such as car passenger doors or car boot doors.

Vehicle door latches are known which are released using a power actuator. Typically the door latch would have a latch bolt retained in position by a pawl and the actuator would act on a release lever connected to the pawl or would act directly on the pawl to release the latch. After the actuator's power stroke, the actuator must return to its initial state in one of three traditional methods:-

- a) Reverse energising of the motor such that the motor is spun in its opposite direction e.g.. reversing the polarity on an electric motor,
- b) Declutching a clutch mechanism situated between the motor and a drive train of the actuating mechanism and returning the drive train by a weak spring,
- c) Back driving the whole of the actuator mechanism including motor and drive train a strong spring.

The problem with reversing the polarity is that many modern vehicle controllers do not allow reverse polarity and more noise is generated due to longer motor operating duration.

The problem with an actuator incorporating a clutch mechanism is that the clutch mechanism itself is expensive, complex and has several parts and that such clutches do not operate consistently.

The problem with back driving the motor and power train is that the motor must be more powerful (and thus more expensive and heavier) to overcome the strong spring, more noise is generated due to longer operating duration, and some systems using helical gears cannot be back driven due to the large lead angle of the helical gears.

Known latch assemblies have primary latched positions wherein the associated door is fully closed and secondary latched positions wherein the associated door is not fully shut but nevertheless is prevented from opening. Such an arrangement has been used particularly on passenger doors of cars as a safety feature and in a legal requirement in many countries. Typically the door seals situated around the periphery of the door, which provide a weather tight seal between the door and its associated aperture, are resilient and are compressed when the door is in its closed condition. Releasing of the latch then allows the seals to partially open the door, at least past the secondary latched position, allowing the user to then fully open the door.

However a problem with such an arrangement is that under some conditions the seal force which tends to open the door can be insufficient to push the latch bolt past the secondary latched position resulting in a door that only opens to the secondary latched position. Under such circumstances the latch has to be unlatched again from the secondary latched position either manually by pulling on a door handle again or in the case of an actuator driven latch by operating the actuator for a second time and pulling the door open. Insufficient seal load could be caused by a door frozen into a closed position, poor fit/misalignment of the door, heavy vertically opening rear boot lids.

It is an object of the present invention to provide a latch assembly including a power actuator which does not require to be driven in a reverse direction.

It is another object of the present invention to provide a latch assembly including a power actuator which does not require clutch mechanisms between a motor and a drive train of the power actuator.

It is another object of the present invention to provide a latch assembly including a power actuator which does not require back driving of the drive train and motor.

It is another object of the present invention to provide a latch assembly having a latch mechanism that does not engage a secondary latch position when operated.

Thus according to the present invention there is provided a latching mechanism including a latch bolt moveable between a primary latched position and an open position,

a first pawl moveable between a first engaged position where it secures the latch bolt in at least its primary latched position and a second released position where it releases the latch bolt from at least its first primary latched position,

release means moveable between a first engaged position where it allows the first pawl to achieve its first engaged position and a second released position where it retains the first pawl in its second released position, and

a second pawl moveable between a first engaged position where it is capable of retaining the release means in its second released position and a second released position where it releases the release means from its second released position

such that the latch mechanism can be latched and unlatched.

According to a further aspect of the present invention there is provided latch mechanism including a power actuator, the power actuator having a motor and a drive train, the drive train having at least one abutment for engagement with a release means of the latch mechanism, energisation of the motor causing the abutment to move the release means from a first engaged position to a second released position to release the latch, in which a retention means (58) is capable of retaining the release means in its second released position.

According to a further aspect of the present invention there is provided a latch mechanism including a power actuator, the power actuator having a motor and a drive train, the drive train having the plurality of abutments for engagement with a release arrangement of the latch mechanism, energisation of the motor causing one of the plurality of abutments to move the release arrangement from a first engaged position to second released position to release the latch, resulting in another of the plurality of abutments co-operating with the release arrangement to provide a drive train stop.

The invention will now be described, by way of example only, with reference to the drawings in which:-

Figure 1 is a view of a latch assembly according to the present invention in a closed condition;

Figure 2 is a view of the latch assembly of figure 1 shown in an unlatching condition;

Figure 3 is a view of the latch assembly of figure 1 shown in a latch opening condition;

Figure 4 is a view of the latch assembly of figure 1 shown in a latching condition whereby super-imposed views of the rotating claw are shown in a primary latched position and secondary latched position; and

Figures 5 and 6 are views of a second embodiment of a latch assembly according to the present invention in an open and closed condition.

With reference to figure 1 to 4 there is shown a latch assembly 10 including a power actuator 12, a latch mechanism 14 and a manual release means 16.

In use the latch assembly 10 would be mounted on a door.

The power actuator includes a motor 18 having a motor shaft 20 drivingly connected to a pinion 22. The power actuator further includes a drive train in the form of a rotor 24.

Rotor 24 is journaled for rotation on plate 26 which forms part of the chassis of the latch assembly. Rotor 24 includes a set of gear teeth 28 which together with pinion 22 form a worm/worm gear drive arrangement. The rotor further includes three circumferentially equispaced posts 30A, 30B, 30C, which project out of the plane of the paper of figure 1.

The latched mechanism includes a latch bolt in the form of a rotating claw 32 having a mouth 34, a primary latching abutment 36, a secondary latching abutment 38 and a trip abutment in the form of a pin 40. The claw 32 is pivotally mounted about pivot 42 on plate 26.

Plate 26 includes a mouth 27 which in conjunction with the mouth 34 provides for the retention and release of a striker pin (not shown) mounted on an associated door aperture.

The rotating claw 32 is biased in a clockwise direction as shown in figure 1 by a resilient means (not shown), though in further embodiments this need not be the case.

The latch mechanism further includes a first pawl 44 pivotally mounted for rotation about pivot 46. Pawl 44 includes a pawl tooth 48 for engagement with the primary and secondary latching abutments 36 and 38 of the rotating claw. Also mounted rotationally about pivot 46 is a release lever 50 having first, second and third arms 52, 54, 56 respectively. Release lever 50 is biased in an anticlockwise direction by a resilient means (not shown) operably acting between the release lever 50 and the plate 26.

A further resilient means (not shown) operates between the first pawl 44 and release lever 50 to bias the first pawl 44 in an anticlockwise direction relative to the release lever

50. Abutment 44A on the first pawl and abutment 50A release on the lever co-operates to limit the anticlockwise movement of the first pawl relative to the release lever.

The latch mechanism further includes a second pawl 58 rotatably mounted about pivot 60 which is turn is mounted on plate 26. Second pawl 58 includes a hook 62 remote from pivot 60 and also a cam surface 64. Second pawl 58 is biased in an anticlockwise direction by a resilient means (not shown) operating between the second pawl 58 and the plate 26. An abutment (not shown) prevents the second pawl 58 from rotating further anticlockwise than is shown in figure 1.

Mounted on second pawl 58 is a third pawl 66 pivotally mounted about pivot 68. Third pawl 66 is arranged such that it can pivot anticlockwise about pivot 68 as a result of contact with pin 40 when the rotating claw 32 moves from a position shown in figure 1 to a position shown in figure 3 i.e. in an opening direction but cannot rotate about pivot 68 clockwise from the position shown in figures 1 and 4 when the rotating claw 32 (and hence the pin 40) moves from the position as shown in figure 4 to the position as shown in figure 1 i.e. in a closing, there being an abutment (not shown) to prevent any such clockwise rotation.

In further embodiments the third pawl could be mounted on the chassis of the latch assembly and nevertheless co-operate with the second claw 58 and pin 40 to release the latch mechanism as described below.

The manual release means 16 comprises a boss 70 having three equispaced lobes 72A, 72B and 72C which bear on an inner surface of the rotor 24 to allow rotation of the boss 70 relative to the plate 26. Lobe 72A includes a post 74 projecting out of the plane of the paper of figure 1 substantially parallel to post 30A.

Lobe 72B further includes an arm 76 having a hole 78 at an end remote from the boss for connection with a manually operated release cable (not shown).

The boss 70 further includes a centrally splined portion 80 for engagement with a manually operable key barrel (not shown).

Operation of the latch assembly is as follows

With reference to figure 1 the latch assembly is shown in a closed position whereby the rotating claw is held in its latched position by the first pawl 44 which is in its corresponding first engaged position whereby tooth 48 engages the primary latching abutment 36. The release lever 50 is shown in its first engaged position and the second pawl 58 is shown in its first engaged position and the second pawl 58 is shown substantially in its first engaged position though as shown in figure 1 second pawl 58 is not engaging third arm 56 (see below).

The motor is energised for say 800 milliseconds, causing the rotor 24 to rotate anticlockwise in the direction of arrow A of the figure 2 resulting in post 30A engaging and moving first arm 52 to the position shown in figure 2. Clearly this movement of first arm 52 causing the release lever 50 and the first pawl 44 to both rotate about pivot 46 in a clockwise direction as shown by arrows B and C, thus disengaging pawl 48 from primary latching abutment 36.

During movement of release lever 50 from its first engaged position as shown in figure 1 to its second released position as shown in figure 2, the third arm 56 initially engages cam surface 64 causing second pawl 58 to rotate clockwise about pivot 60. Once the third arm 56 has passed the cam surface 64, the bias means (not shown) biases the second pawl 58 anticlockwise about pivot 60 such that the third arm 56 is engaged behind the hook 62, thus retaining the release lever 50 in the position as shown in figure 2. In this position the end of second arm 54 acts as a stop abutment in co-operation with post 30C preventing further rotation of rotor 24.

Typically the time taken to move from the position as shown in figure 1 to the position as shown figure 2 might be 500 milliseconds, thus the motor would be stalled for

the last 300 milliseconds of the 800 millisecond motor energisation as a result of post 30C abutting the end of second arm 54.

Once the latch assembly has achieved the position as shown in figure 2 the latch claw is free to rotate in a clockwise direction as shown by arrow E of figure 3 thus releasing the striker from the mouth 27 and allowing the door, or boot lid etc. to open.

Note that in figure 2 the latch bolt is shown in its primary latched position though is free to rotate to its open position, the first pawl is shown in its second released position, the release lever is shown in its second released position, and the second pawl is shown in its first engaged position whereby it engages third arm 56.

Further note that first pawl 44 is maintained in its second release position by co-operating abutments 44A and 50A, and the release lever is maintained in its second release position by the second pawl. Thus it is the second pawl that maintains the first pawl in its second release position via the intermediary of the release lever 50.

As described above during the movement of the rotating claw from the position as shown in figure 2 to the position as shown in figure 3, the pin 40 trips past the third pawl 66 without affecting the position of the second pawl 58 which continues to retain third arm 56 and hence the release lever 50 in its second released position.

It should be noted that during movement of the rotating claw from the position as shown in figure 2 to the position as shown in figure 3, the pawl tooth 48 of the first pawl 44 is held out of engagement with the rotating claw and thus cannot engage the secondary latching abutment 38 as it passes underneath the pawl tooth 48.

Subsequent closing of the door associated with the latch assembly 10 causes the striker pin (not shown) to enter mouth 27 and mouth 34 resulting in the rotating claw 32 rotating anticlockwise in a closing direction as shown by arrow F of figure 4 to a secondary latched position as shown by profile X of rotating claw 32 or, the door is slammed hard enough, to a primary latched position as shown by profile Y of the rotating claw 32. This

causes pin 40 to contact the third pawl 66 which, as described above, cannot rotate from the position shown in figure 4 clockwise relative to the second pawl 58. Thus the pin 40 causes the third pawl 66 and second pawl 58 to both rotate in unison clockwise as shown by arrow G about pivot 60. This action disengages the hook 66 from the end of third arm 56 allowing the release lever 50 and first pawl 44 to rotate anticlockwise as shown by arrows H and J thus re-engaging pawl tooth 48 with the primary or secondary latching abutment 36 or 38 as appropriate.

It should be noted that the relative positions of the pin 40, secondary latching abutment 38 and first pawl 44 is such that the hook 66 is caused to disengage the end of third arm 56 just before the secondary latching abutment 38 passes under pawl tooth 48. Thus in the event that the door is not slammed hard enough to be fully closed the pawl tooth 48 will nevertheless engage the secondary latching abutment 36 as described above.

Note that pin 40 moves past second pawl 58 when the rotating claw 32 moves from the closed position as shown in figure 1 to the open position as in figure 3 without affecting the position of the second pawl. Furthermore pin 40 again moves past second pawl 58 when moving from the open position as shown in figure 3 to the closed position as shown in figure 1, however, under these circumstances it does affect the position of the second pawl as it moves past the second pawl.

Subsequent energising of the motor 18 following closing of the latch as shown in figure 4 will unlatch the door in a similar sequence as described above, but note that post 30C (as opposed to post 30A as described above) is now positioned to act on first arm 52 to open the latch. In this case since there are three posts 30A, 30B and 30C, a single energising operation of motor 18 results in rotor 24 only rotating through 120 degrees.

In further embodiments there may be more or less than three posts connected to the rotor.

Manual operation of the manual release means 16 by either operation of the cable connected to hole 78 or operation of the key barrel engaged with splined portion 80 results

in post 74 rotating anticlockwise and engaging and moving first arm 52 in a manner similar to that as described above wherein post 30A engages and moves first arm 52. Note that during this manual disengagement the pawl tooth 48 cannot engage the secondary latching abutment 38 since it is held away from the rotating claw by the release lever 50 which is secured in its second released position by hook 62 as described above in relation to power opening of the latch.

With reference to figures 5 and 6 there is shown a second embodiment of a latch assembly 110 with features equivalent to latch assembly 10 labelled 100 greater.

A release arrangement 181 is formed by the combination of release lever 150 and pawl 144. In this case release lever 150 and pawl 144 are rotationally fast relative to each other, though in further embodiments this need not be the case.

Rotor 124 includes 3 abutments H1, H2 and H3 at a central portion of the rotor which form a first set of abutments H. Rotor 124 also includes abutments J1, J2 and J3 at a peripheral region of the rotor which form a second set of abutments J.

The release lever 150 and first set of abutments H lie in a first plane and the pawl 144 and second set of abutments J lie in a second plane different from the first plane thus allowing the second set of abutments J to pass underneath release lever 150 when the rotor 124 rotates.

Operation of the latch assembly 110 is as follows:-

Consideration of figure 6 shows the latch assembly 110 in a closed position with pawl 148 acting against latching abutment 136 to retain the rotating claw 132 in the closed position. It should be noted that abutment H1 is in contact with the end of release lever 150.

Actuation of motor 118 causes the rotor 124 to rotate in anticlockwise direction when viewing figure 6 whereupon abutment H1, acting on the end of release lever 150

causes the release lever and pawl 144 to rotate in a clockwise direction to the position as shown in figure 5.

It should be noted from figure 5 that abutment H1 has just disengaged the end of release lever 150 but at the same moment pawl tooth 148 has engaged abutment J2 thus stopping further rotation of the rotor and causing the motor 118 to momentarily stall until such time as the power to the motor is cut. Stopping the rotor 124 in this manner ensures that it is orientated in the correct position ready for its next operation.

Once the power to the motor is cut then there is no longer any force acting between abutment J2 and pawl tooth 148 whereupon the pawl 144 and release lever 150 can return to the position as shown in figure 6 (though with the rotor 124 and rotating claw 132 remaining in the position as shown in figure 5) awaiting a subsequent closure of the latch.

It should be noted that the release lever is sequentially operated by abutments H1, H2 and H3 and that the rotor 124 sequentially stopped by abutment J1, J2 and J3. Furthermore the release lever is only ever operated by abutments H1, H2 and H3 and the rotor is only ever stopped by abutments J1, J2 and J3.

Claims

1. A latch mechanism including;

a latch bolt moveable between a primary latched position and an open position,

a first pawl moveable between a first engaged position, where it secures the latch bolt in at least its primary latched position and a second released position, where it releases the latch bolt from at least its first primary latched position,

release means moveable between a first engaged position, where it allows the first pawl to achieve its first engaged position and a second released position, where it retains the first pawl in its second released position, and

a second pawl moveable between a first engaged position, where it is capable of retaining the release means in its second released position, and a second released position, where it releases the release means from its second released position,

such that the latch mechanism can be latched and unlatched.

2. A latch mechanism as defined in claim 1 in which the release means is fast with the first pawl.

3. A latch mechanism as defined in claim 1 in which release means is moveable relative to the first pawl.

4. A latch mechanism as defined in any preceding claim in which the latch bolt additionally has a secondary latched position intermediate the primary latch position and the open position.

5. A latch mechanism as defined in any preceding claim in which a trip abutment on the latch bolt is capable of moving the second pawl from its first engaged position to its second released position allowing the latch mechanism to latch.

6. A latch mechanism as defined in claim 5 in which the trip abutment is capable of moving the second pawl during movement of the latch bolt from its open position to its primary or secondary latched position.
7. A latch mechanism as defined in claim 5 or 6 in which the trip abutment does not affect retention of the release means in its second released position by the second pawl during movement of the latch bolt from its primary or secondary latched position to its open position.
8. A latch mechanism as defined in claim 5 or 6 or 7 in which the trip abutment moves the second pawl by engagement with a third pawl.
9. A latch mechanism as defined in claim 8 in which the third pawl allows the latched bolt to move from its primary or secondary latched position to its open position without movement of the second pawl.
10. A latch mechanism as defined in claim 8 or 9 in which the third pawl is mounted on the second pawl.
11. A latch mechanism as defined in claim 8 or 9 in which the third pawl is mounted on a chassis of the latch assembly.
12. A latch mechanism as defined in any preceding claim in which a first arm of the release means is engaged to move the release means from its first engaged position to its second released position.
13. A latch mechanism as defined in any preceding claim in which an arm (56) of the release means is engaged by the second pawl to retain the release means in its second released position.

14. A latch mechanism as defined in any preceding claim including a power actuator having a motor and a drive train.
15. A latch mechanism as defined in claim 14 in which the motor only operates in one direction.
16. A latch mechanism as defined in claim 14 or 15 in which the drive train only operates in one direction.
17. A latch mechanism as defined in any one of claims 14 to 16 in which the drive train includes a first abutment operable to move the release means from its first engaged position to its second released position.
18. A latch mechanism as defined in claim 17 when dependent upon claim 12 in which the first abutment of the drive train engages the first arm of the release means.
19. A latch mechanism as defined in claims 14 to 18 in which the drive train includes a second abutment which co-operates with the release means to provide a drive train stop.
20. A latch mechanism as defined in claim 19 in which the second abutment co-operates with an arm (54) of the release means.
21. A latch mechanism as defined in claim 19 or 20 when dependent upon claim 17 in which the first abutment is capable of acting as the second abutment.
22. A latch mechanism including a power actuator, the power actuator having a motor and a drive train, the drive train having at least one abutment for engagement with a release means of the latch mechanism, energisation of the motor causing the abutment to move the release means from a first engaged position to a second released position to release the latch, in which a retention means (58) is capable of retaining the release means in its second released position.

23. A latch mechanism including a power actuator, the power actuator having a motor and a drive train, the drive train having a plurality of abutments for engagement with a release arrangement of the latch mechanism, energisation of the motor causing one of the plurality of abutments to move the release arrangement from a first engaged position to second released position to release the latch, resulting in another of the plurality of abutments co-operating with the release arrangement to provide a drive train stop.

24. A latch mechanism as defined in Claim 23 in which the latch mechanism includes a latch bolt moveable between a primary latch position and an open position, and the release arrangement includes a first pawl moveable between a first engaged position where it secures the latch bolt in at least its primary latch position and a second release position, where it releases the latch bolt from at least its first primary latch position, the release arrangement further including release means moveable between the first engaged position, where it allows the first pawl to achieve its first engaged position and a second release position where it retains the first pawl in its second release position.

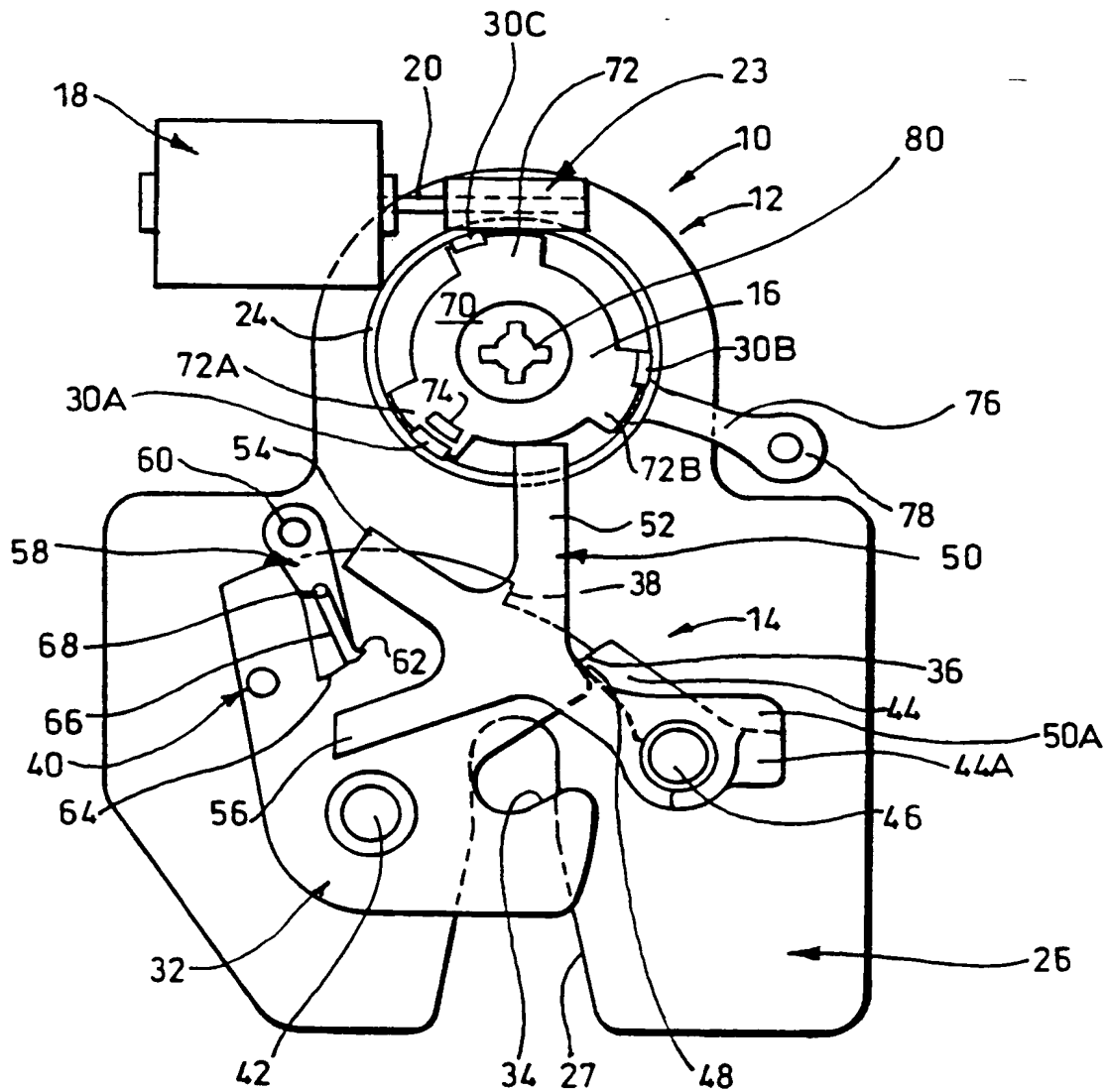
25. A latch mechanism as defined in Claim 24 in which the release means is fast with the first pawl.

26. A latch arrangement as defined in Claim 24 in which the release means is moveable relative to the first pawl.

27. A latch mechanism as defined in Claims 23 to 26 in which the plurality of abutments includes a first set of abutments to move the release arrangement from the first engaged position to the second release position and a second set of abutments for co-operation with the release arrangement to provide the drive train stop.

28. A latch mechanism as defined in Claim 27 when dependent upon Claim 24 in which the first set of abutments acts on the release means and the second set of abutments act on the pawl.

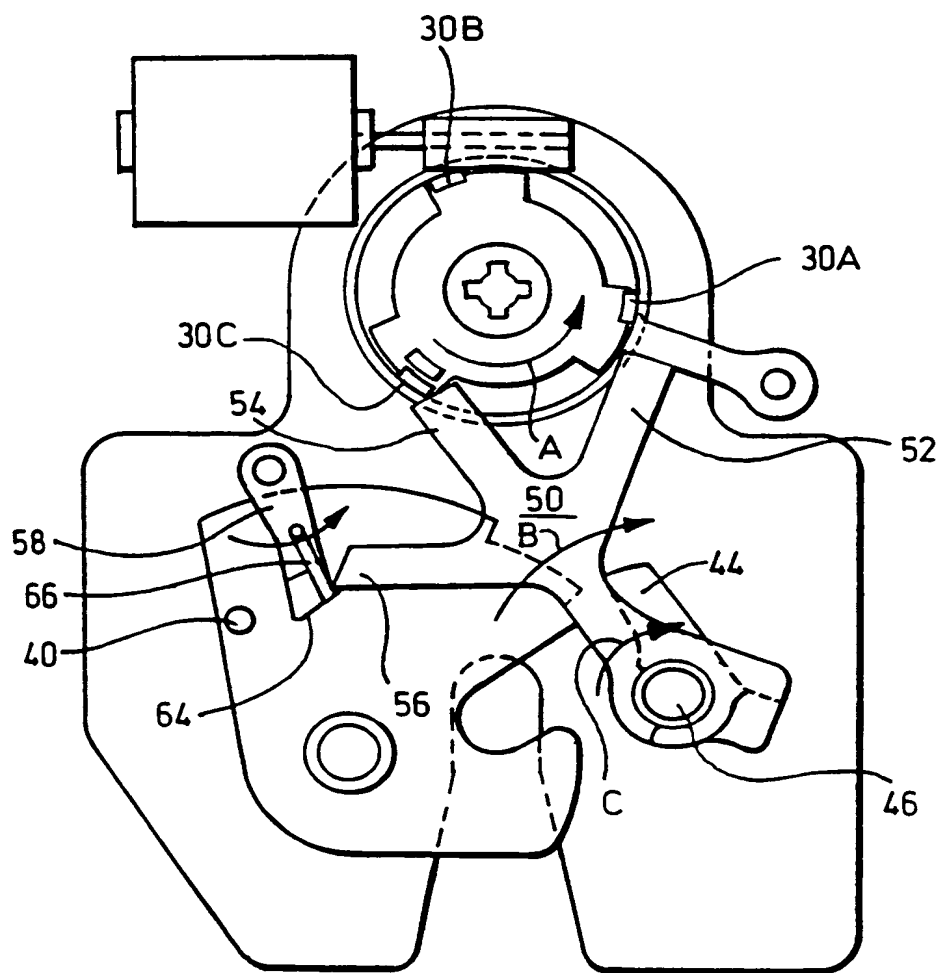
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LATCH CLOSED

FIG.1.

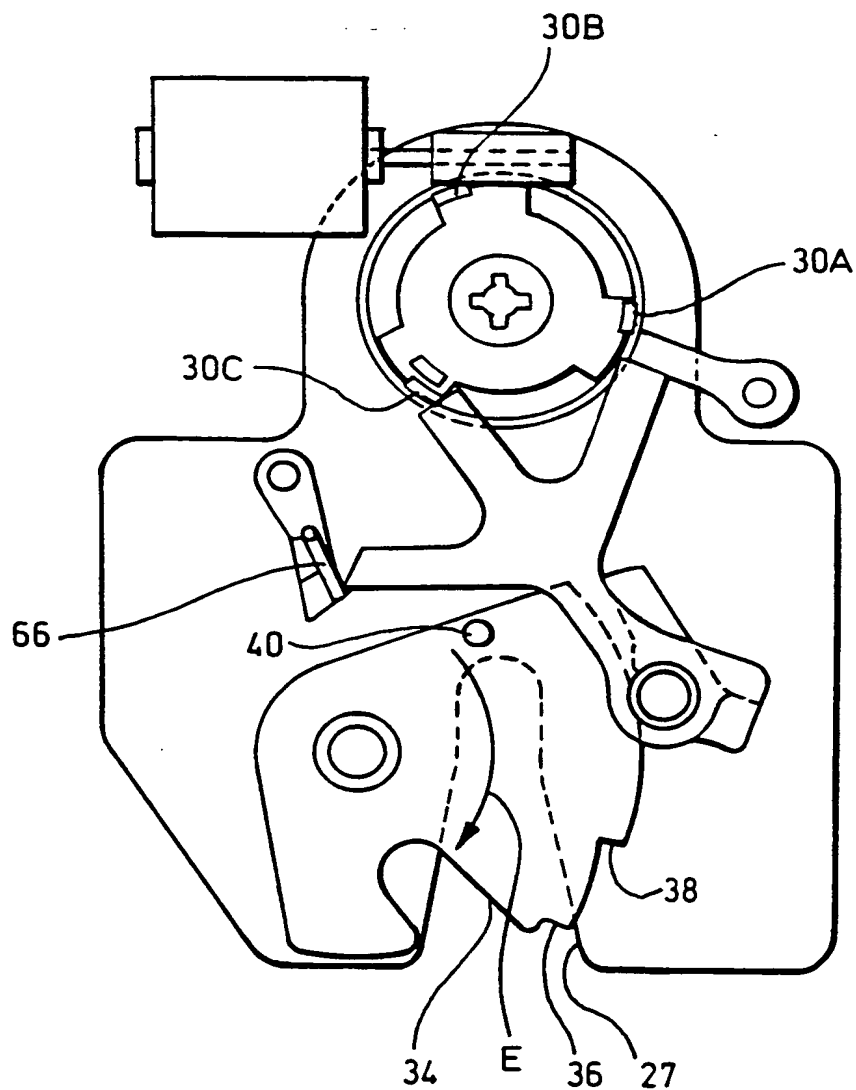
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UNLATCHING

FIG.2.

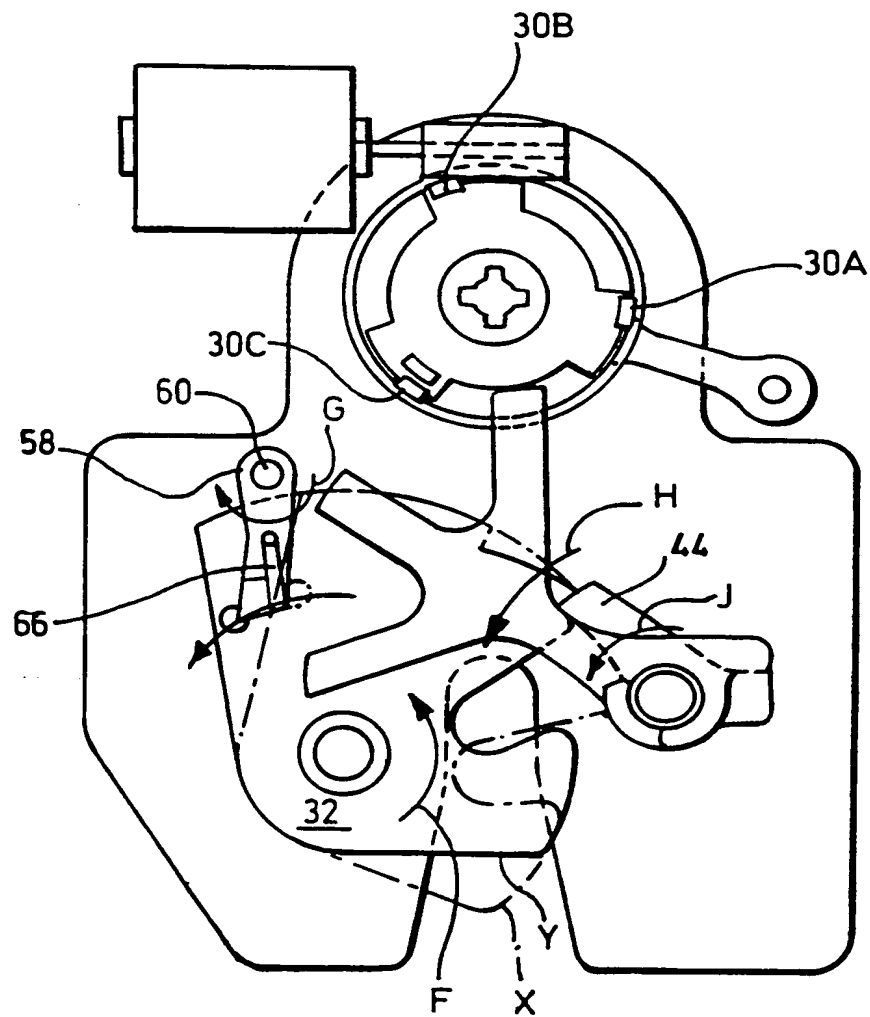
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LATCH OPENING

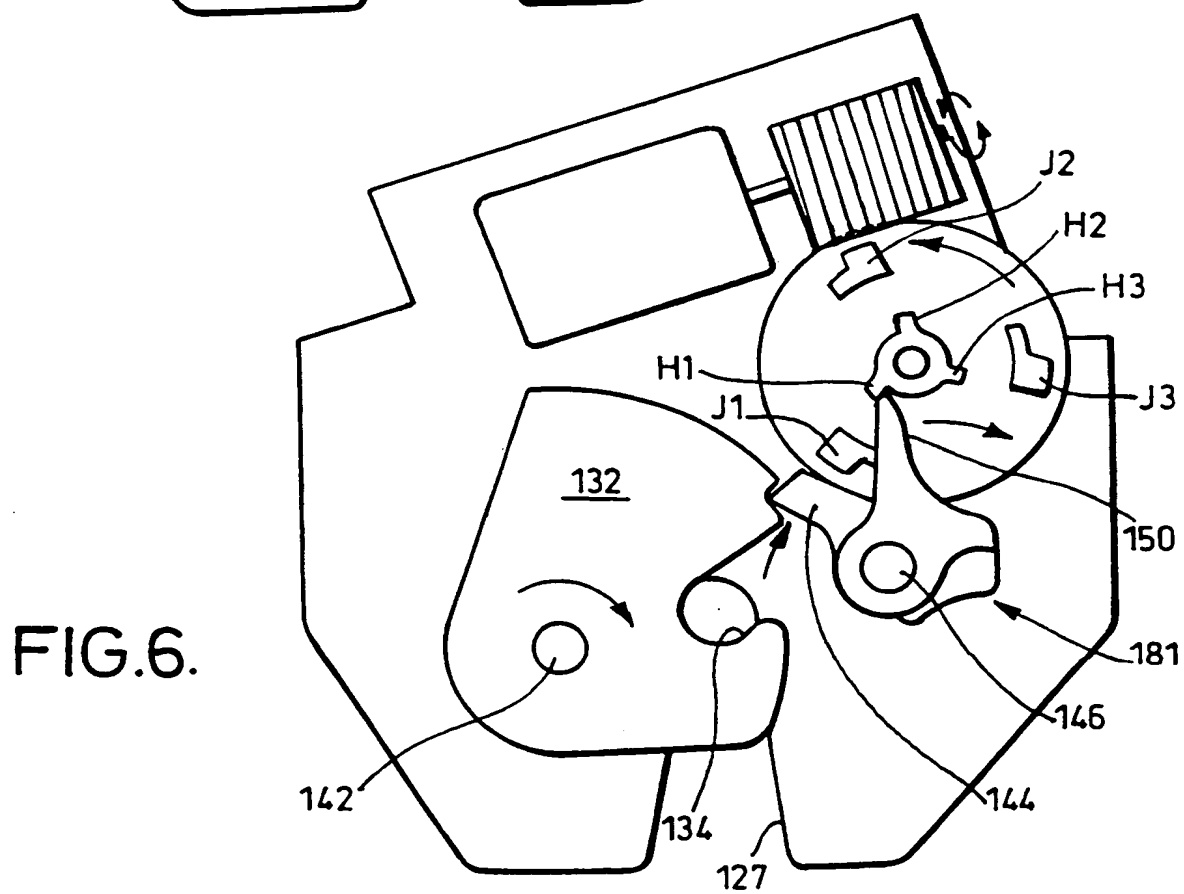
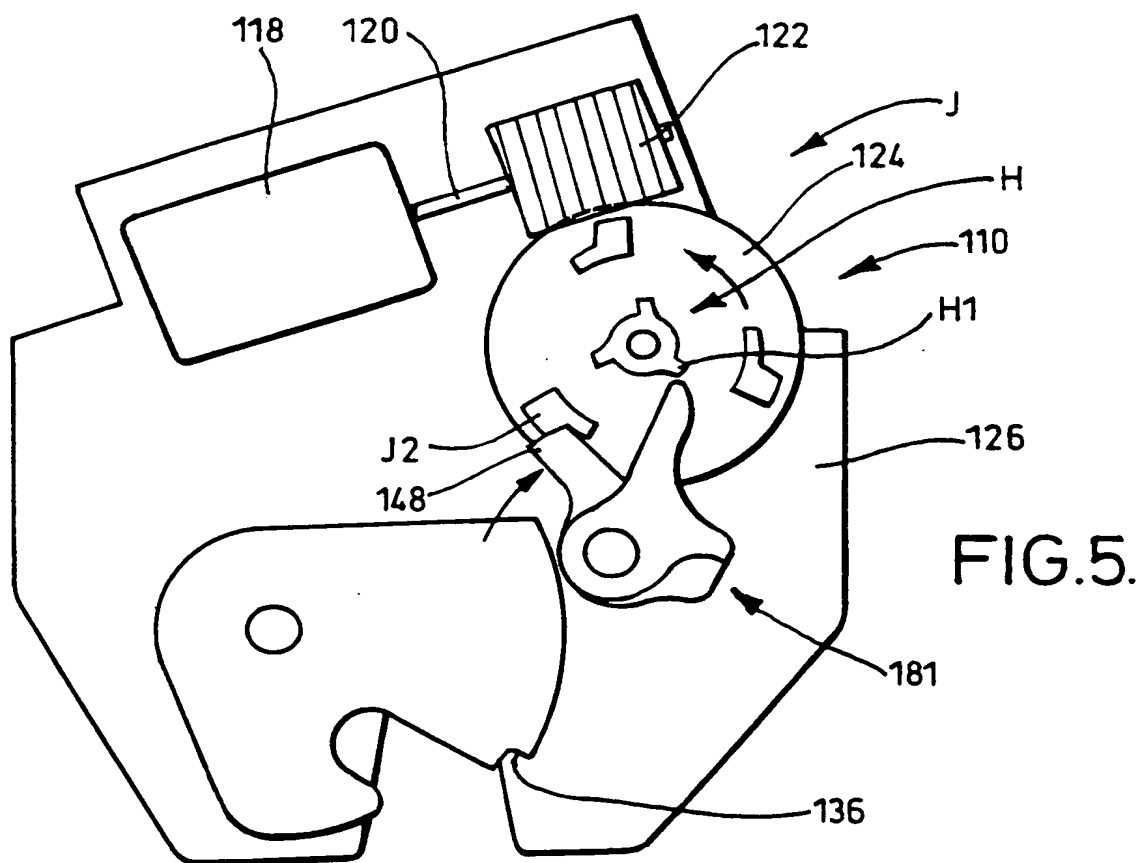
FIG.3.

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LATCHING

FIG.4.



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(71) Applicant (for all designated States except US): MERITOR LIGHT VEHICLE SYSTEMS (UK) LIMITED [GB/GB]; Fordhouse Lane, Stirchley, Birmingham B30 3BW (GB).

(72) Inventors; and

(75) Inventors/Applicants (for US only): EVANS, Michael [GB/GB]; Meritor Light Vehicle Systems (UK) Limited, Fordhouse Lane, Stirchley, Birmingham B30 3BW (GB). FROST, James [GB/GB]; Meritor Light Vehicle Systems (UK) Limited, Fordhouse Lane, Stirchley, Birmingham B30 3BW (GB). SPURR, Nigel, Victor [GB/GB]; 119 Tixall Road, Hall Green, Birmingham B28 0RP (GB). LI, Mark, Hao [CA/GB]; 68 Warwick Crest, Arthur Road, Edgbaston, Birmingham B15 2LH (GB).

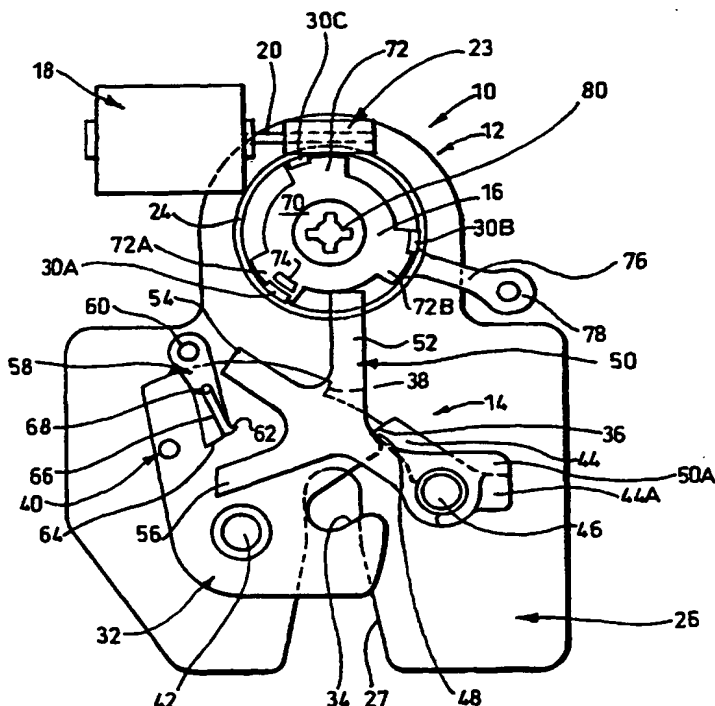
(74) Agents: JONES, John, Bryn et al.; Withers & Rogers, Goldings House, 2 Hays Lane, London SE1 2HW (GB).

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[Continued on next page]

(54) Title: LATCH ASSEMBLY



LATCH CLOSED

(57) Abstract: A latch mechanism (10) including: a latch bolt (32) moveable between a primary latched position and an open position, a first pawl (44) moveable between a first engaged position, where it secures the latch bolt in at least its primary latched position and a second released position, where it releases the latch bolt from at least its first primary latched position, release means (50) moveable between a first engaged position, where it allows the first pawl to achieve its first engaged position and a second released position, where it retains the first pawl in its second released position, and a second pawl (58) moveable between a first engaged position, where it is capable of retaining the release means in its second released position, and a second released position, where it releases the release means from its second released position, such that the latch mechanism can be latched and unlatched.

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INTERNATIONAL SEARCH REPORT

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PCT/GB 00/02540A. CLASSIFICATION OF SUBJECT MATTER
E05B65/32,E05B65/12According to International Patent Classification (IPC) or to both national classification and IPC⁷

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

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European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

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C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	✓ DE 3220705 A1 (TACK & GABEL GMBH & CO KG) 08 December 1983, pages 6-11, figs. 1-4. --	1
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ANHANG

Zum internationalen Recherchenbericht über die internationale Patentanmeldung Nr.

In diesem Anhang sind die Mitglieder der Patentfamilien der im obengenannten internationalen Recherchenbericht angeführten Patentdokumente angegeben. Diese Angaben dienen nur zur Unterrichtung und erfolgen ohne Gewähr.

ANNEX

To the International Search Report to the international Patent Application No.

PCT/GB 00/02540 SAE 290247

This annex lists the patent family members relating to the patent documents cited in the above-mentioned search report. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

ANNEXE

Au rapport de recherche international relatif à la demande de brevet international n°

La présente annexe indique les membres de la famille de brevets relatifs aux documents de brevets cités dans le rapport de recherche international visée ci-dessus. Les renseignements fournis sont donnés à titre indicatif et n'engagent pas la responsabilité de l' Office.

Im Recherchenbericht angeführte Patentdokumente Patent document cited in search report Document de brevet cité dans le rapport de recherche			Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
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